

VACUUM TOLERANCE OF TARDIGRADES (ABSTRACT)

Kazuo UTSUGI and Hirokuni NODA

*Department of Biology, Tokyo Women's Medical College,
8-1, Kawadacho, Shinjuku-ku, Tokyo 162*

The recovery from cryptobiosis of tardigrades was examined after observation by scanning electron microscope (SEM).

Three species of tardigrades (*Milnesium tardigradum*, *Macrobiotus harmsworthi* and *Echiniscus japonicus*) were used together with two species of mosses (*Bryum argenteum* and *Oncophorus crispifolius*). Five to ten animals were put on a hole slide with either a moss, gametophyte, a one-sided leafless gametophyte, or a few single leaves of moss, and covered with coverglass. All of these preparations were slowly dehydrated at room temperature without any chemicals. After 5–24 hours, all tardigrades entered into a cryptobiotic state (latent life).

The tun-shaped animals were transferred onto a preparation disk of the SEM for coating with gold flash under vacuum and then observed with a Hitachi HHR-2 SEM under 5×10^{-4} Pa (5×10^{-6} Torr) for 30–60 min. To examine the recovery from cryptobiosis after SEM observation, the animals were transferred again onto hole slides and water was added.

All of *Mil. tardigradum* prepared with *B. argenteum* extended their bodies and crept actively about 10 min after supplying water and survived for about 24 hours. Even with the moss, *O. crispifolius*, 57–90% of *Mil. tardigradum* recovered. In the case of *M. harmsworthi*, the recovery rates are different from 50%, 54% to 100%, depending on the form of moss. However, the recovery rate of *E. japonicus* was 33%. This was considerably lower than the above two species. Further, it took about 30–60 min for recovery after supplying water and the survival time was short (within a few hours).

It was shown that during the cryptobiotic state, tardigrades acquire a high tolerance to lower pressure vacuum, besides desiccation, extreme temperatures, radiation and so on.

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